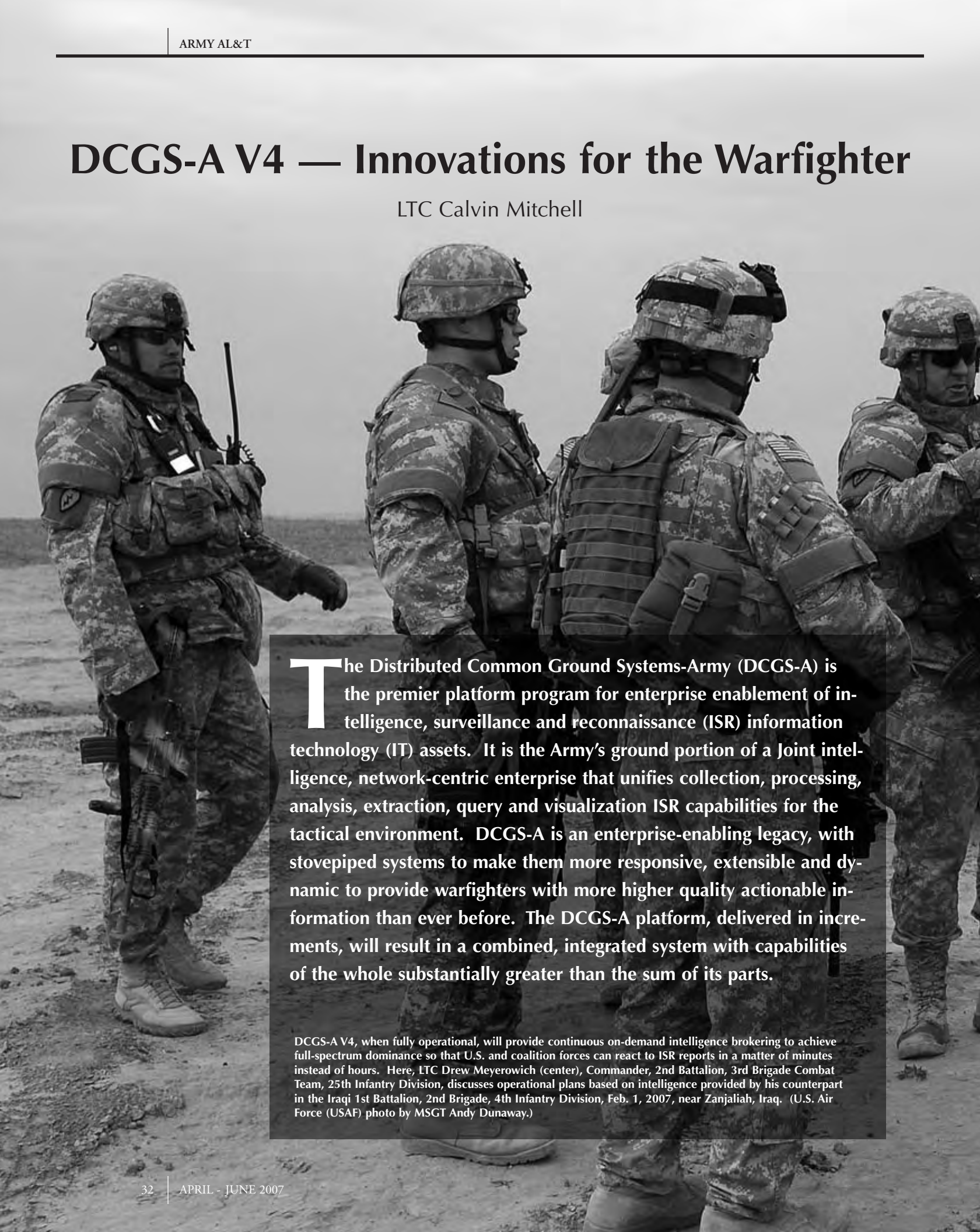


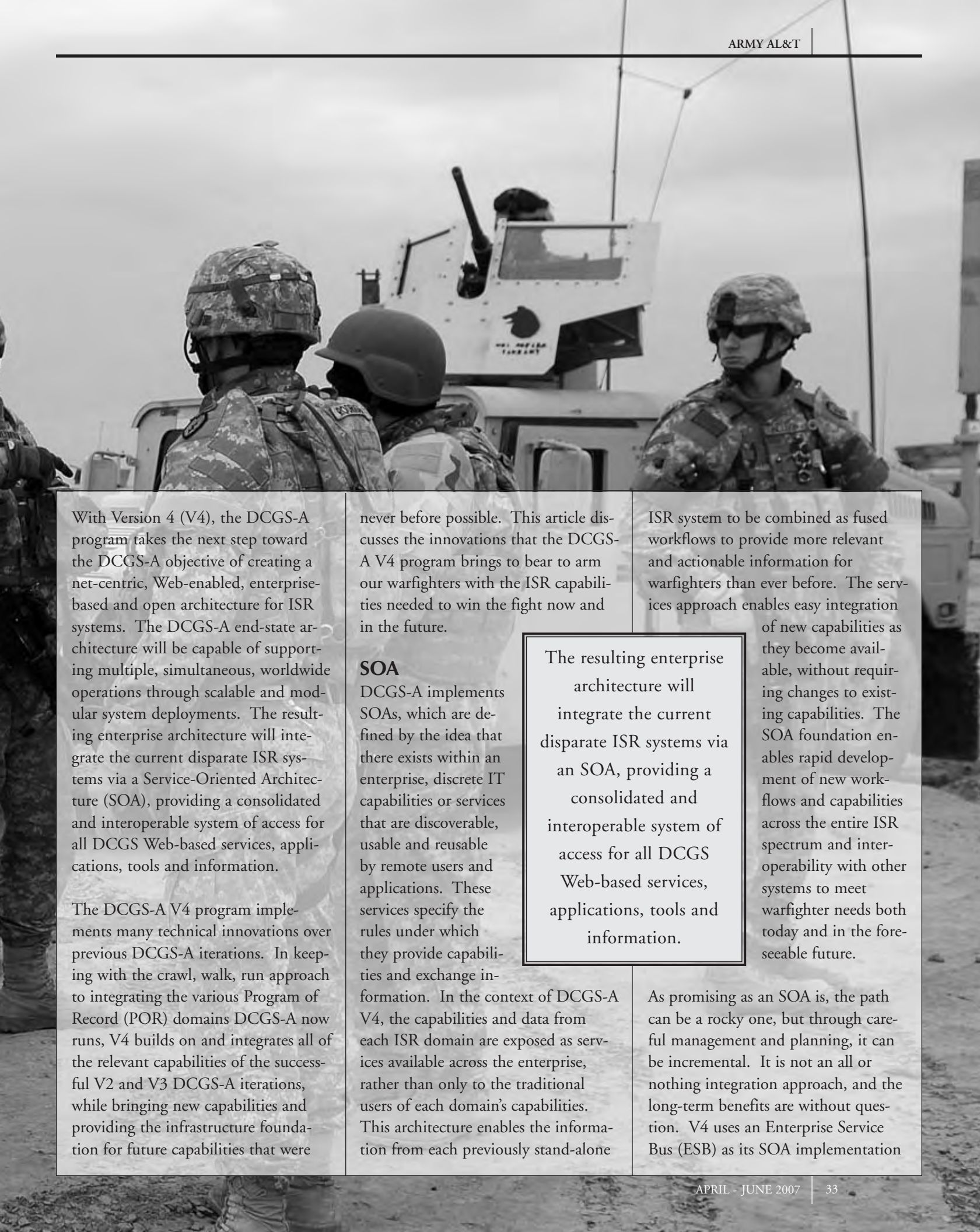
DCGS-A V4 — Innovations for the Warfighter

LTC Calvin Mitchell



The Distributed Common Ground Systems-Army (DCGS-A) is the premier platform program for enterprise enablement of intelligence, surveillance and reconnaissance (ISR) information technology (IT) assets. It is the Army's ground portion of a Joint intelligence, network-centric enterprise that unifies collection, processing, analysis, extraction, query and visualization ISR capabilities for the tactical environment. DCGS-A is an enterprise-enabling legacy, with stovepiped systems to make them more responsive, extensible and dynamic to provide warfighters with more higher quality actionable information than ever before. The DCGS-A platform, delivered in increments, will result in a combined, integrated system with capabilities of the whole substantially greater than the sum of its parts.

DCGS-A V4, when fully operational, will provide continuous on-demand intelligence brokering to achieve full-spectrum dominance so that U.S. and coalition forces can react to ISR reports in a matter of minutes instead of hours. Here, LTC Drew Meyerowich (center), Commander, 2nd Battalion, 3rd Brigade Combat Team, 25th Infantry Division, discusses operational plans based on intelligence provided by his counterpart in the Iraqi 1st Battalion, 2nd Brigade, 4th Infantry Division, Feb. 1, 2007, near Zanjaliah, Iraq. (U.S. Air Force (USAF) photo by MSGT Andy Dunaway.)



With Version 4 (V4), the DCGS-A program takes the next step toward the DCGS-A objective of creating a net-centric, Web-enabled, enterprise-based and open architecture for ISR systems. The DCGS-A end-state architecture will be capable of supporting multiple, simultaneous, worldwide operations through scalable and modular system deployments. The resulting enterprise architecture will integrate the current disparate ISR systems via a Service-Oriented Architecture (SOA), providing a consolidated and interoperable system of access for all DCGS Web-based services, applications, tools and information.

The DCGS-A V4 program implements many technical innovations over previous DCGS-A iterations. In keeping with the crawl, walk, run approach to integrating the various Program of Record (POR) domains DCGS-A now runs, V4 builds on and integrates all of the relevant capabilities of the successful V2 and V3 DCGS-A iterations, while bringing new capabilities and providing the infrastructure foundation for future capabilities that were

never before possible. This article discusses the innovations that the DCGS-A V4 program brings to bear to arm our warfighters with the ISR capabilities needed to win the fight now and in the future.

SOA

DCGS-A implements SOAs, which are defined by the idea that there exists within an enterprise, discrete IT capabilities or services that are discoverable, usable and reusable by remote users and applications. These services specify the rules under which they provide capabilities and exchange information. In the context of DCGS-A V4, the capabilities and data from each ISR domain are exposed as services available across the enterprise, rather than only to the traditional users of each domain's capabilities. This architecture enables the information from each previously stand-alone

ISR system to be combined as fused workflows to provide more relevant and actionable information for warfighters than ever before. The services approach enables easy integration

of new capabilities as they become available, without requiring changes to existing capabilities. The SOA foundation enables rapid development of new workflows and capabilities across the entire ISR spectrum and interoperability with other systems to meet warfighter needs both today and in the foreseeable future.

The resulting enterprise architecture will integrate the current disparate ISR systems via an SOA, providing a consolidated and interoperable system of access for all DCGS Web-based services, applications, tools and information.

As promising as an SOA is, the path can be a rocky one, but through careful management and planning, it can be incremental. It is not an all or nothing integration approach, and the long-term benefits are without question. V4 uses an Enterprise Service Bus (ESB) as its SOA implementation

to provide a manageable, well-structured infrastructure on which to integrate various SOA components. ESBs connect, control and mediate the interactions between applications and services.

Possibly, the most important benefit of using an ESB to realize an SOA is that business logic, previously implemented in each intelligence application, can be moved into a separate business logic engine with full enterprise visibility, making the integrated system more flexible and better able to address changing business requirements, such as, in DCGS-A's case, the need for more sophisticated fusion than is available today.

Multi-Intelligence (INT) Threads

While significant steps have been taken to provide actionable fused information across domains in the existing ISR systems, for the most part, the fusion of data from the various INTs is left to the analysts. Because of their architecture, state-of-the-art when they were developed, the current INT systems that provide fusion cannot be easily and quickly modified to meet evolving warfighter requirements. Most use tightly coupled interfaces to other INT systems, making them extremely difficult to maintain and



DCGS-A V4 will enhance battle command response to enemy insurgent movements, leading to greater accuracy in estimating potential targets. Here, SSG Bill Hatzman, Troop C, 4th Squadron, 14th Cavalry Regiment, radios civilian movement information near the Iraq/Syria border. (USAF photo by TSGT Andy Dunaway.)

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upgrade. The SOA approach employed by V4 consolidates existing domain software and enables the

creation of new multi-INT threads that do not exist in current PORs such as collection planning, common operational picture, cross-queuing sensors, multi-INT folders and others. In the past, new thread development required a significant software development effort. With V4, new threads become more of a business logic configuration task than a software development exercise, enabling DCGS-A to more quickly meet evolving ISR requirements.

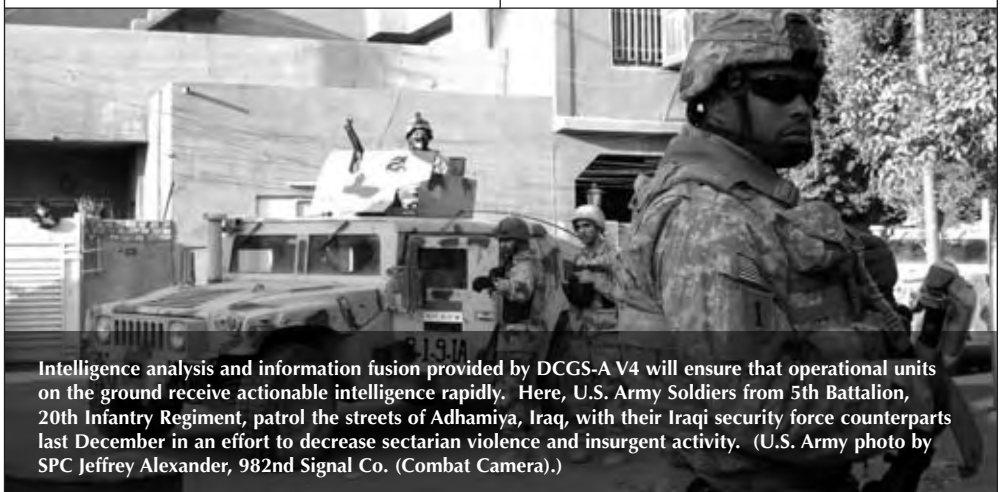
Consolidated Portal and Multifunction Workstation (MFWS)

The V4 system uses a portal as the primary user interface. The portal enables users — assuming adequate communications bandwidth — access to

the DCGS-A V4 system regardless of where they are located in the DOD enterprise. DCGS-A V4 also provides the foundation to enable access from virtually any device capable of supporting a standard Internet browser, including personal digital assistants and other lightweight access devices. The DCGS-A MFWS remains a critical V4 component and is used primarily for applications not well suited to a portal, such as streaming data. To the extent possible, the portal and MFWS have a common look and feel to enable analysts to easily switch between user interfaces.

Consolidated Infrastructure

V4 consolidates multiple independent INT software systems into a single software infrastructure reducing server footprint, simplifying maintenance, reducing costs, increasing performance



Intelligence analysis and information fusion provided by DCGS-A V4 will ensure that operational units on the ground receive actionable intelligence rapidly. Here, U.S. Army Soldiers from 5th Battalion, 20th Infantry Regiment, patrol the streets of Adhamiya, Iraq, with their Iraqi security force counterparts last December in an effort to decrease sectarian violence and insurgent activity. (U.S. Army photo by SPC Jeffrey Alexander, 982nd Signal Co. (Combat Camera).)

DCGS-A V4 will be capable of supporting multiple, simultaneous, worldwide operations through scalable, modular system deployments. Here, Soldiers from 1st Battalion, 68th Armored Regiment, 3rd Brigade Combat Team, 4th Infantry Division, conduct a population patrol operation in a small village adjacent to Forward Operating Base Warhorse, Iraq, last October. (USAF photo by TSGT Michele A. Desrochers, 4th Combat Camera Squadron.)



and improving overall system security and reliability. V4 also enables consolidation of disparate INT data stores. In V4, the common functionality needed by multiple INT domains, such as enterprise access and query, collaboration, messaging, integration infrastructure services, the DCGS Integration Backbone (DIB) Metadata Catalogue, portal framework, maintenance, communications hardware configuration and the gateways to the larger ISR enterprise, are all provided by the core system infrastructure, which reduces or eliminates functional duplication, while providing a common look and feel for analysts across the entire system.

Consolidated Modular Footprint

From a hardware perspective, V4 uses a consolidated server farm for all processing, providing more capability on less hardware than the same stand-alone INT systems in use today. In addition, V4 can be deployed in modules based on mission type, enabling the right footprint sizing. As time progresses and processors become more powerful,

the footprint will continue to shrink, increasing mobility and reducing both capital and operational costs, all while increasing reliability.

The V4 SOA is an optimal way to build an integrated enterprise because the ESB streamlines SOA implementation.

V4 provides the foundation that will enable warfighters to receive sophisticated, fused, timely and actionable information based on raw data from all current and future INT capabilities in a single system.

Although SOA can be built without an ESB, the ESB allows business logic to be removed from the applications it integrates, exposed as Web services, and executed as a separate and configurable non-coded process, greatly simplifying and speeding creation of new system capabilities. From

DCGS-A's perspective, this means more advanced ISR fusion for battlefield commanders from existing and new basic services.

V4 SOA implementation is key to achieving the DCGS-A vision of an integrated, flexible, scalable, reliable and easily programmable ISR system. V4 provides the foundation that will enable warfighters to receive sophisticated, fused, timely and actionable information based on raw data from all

current and future INT capabilities in a single system. In addition, DCGS-A V4 will employ Joint standards, protocols and services in a common DIB-based architecture to enhance interoperability and integration.

Through the effort of government and industry subject matter experts, including ISR users from the U.S. Army Training and Doctrine Command Capability Manager, working in concert with the integrated product teams and their associated working groups, the Project Manager (PM) DCGS-A and industry team is diligently working to ensure the Army's vision for a premier enterprise-enabled ISR platform.

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